Salmon Team Evaluation of Upstream Actions

The DEFT Salmon Subgroup was assigned the task to evaluate the upstream actions proposed in the CALFED Stage I Implementation and during the long-term Ecosystem Restoration Program. The Salmon Subgroup was to assess the degree to which upstream actions would likely contribute to the recovery of endangered species including salmon stocks proposed for listing.

In the analysis, the Salmon Team evaluated the potential benefits of restoration actions for the following stocks,
- Sacramento River winter-run chinook salmon
- spring-run chinook salmon
- late-fall-run chinook salmon
- Sacramento fall-run chinook salmon
- San Joaquin fall-run chinook salmon
- Mokelumne River fall-run chinook salmon (Note: The team agreed to assess Mokelumne River independently due to its connection with the Delta and potential affects of conveyance alternatives).

Fall-run Chinook Salmon

For fall-run chinook salmon, the Salmon Team selected nine streams that accounted for nearly 96% of the returns during 1967-1991 (Table 1). These streams were analyzed for chinook salmon trend data and cohort replacement rates were calculated. These analyses contributed to the assessment of cumulative benefits of restoration actions.

TABLE 1.	Distribution of Fall-run Chinook Salmon by Watershed Based On Average Returns for 1967-1991.					
Rank	River or Stream	Average spawners	Cumulative total	Percent of total	Cumulative percent	Selected for Analysis
1	Sacramento River	76,701	76,701	38.4%	38.4%	Yes
2	Feather River	41,003	117,704	20.5%	58.9%	Yes
3	American River	32,307	150,011	16.2%	75.1%	Yes
4	Yuba River	12,868	162,879	6.4%	81.6%	Yes
5	Tuolumne River	8,923	171,802	4.5%	86.0%	Yes
6	Battle Creek	8,369	180,171	4.2%	90.2%	Yes
7	Stanislaus River	4,807	184,978	2.4%	92.6%	Yes
8	Merced River	4,035	189,013	2.0%	94.7%	Yes
9	Mokelumne River	2,553	191,566	1.3%	95.9%	Yes
10	Cottonwood Creek	1,647	193,213	0.8%	96.8%	No
11	Clear Creek	1,584	194,797	0.8%	97.6%	No
12	Cow Creek	1,373	196,170	0.7%	98.2%	No
13	Mill Creek	1,104	197,274	0.6%	98.8%	No
14	Cosumnes River	764	198,038	0.4%	99.2%	No
15	Butte Creek	418	198,456	0.2%	99.4%	No
16	Deer Creek	406	198,862	0.2%	99.6%	No
17	Miscellaneous	304	199,166	0.2%	99.7%	No
18	Big Chico Creek	242	199,408	0.1%	99.9%	No
19	Antelope Creek	192	199,600	0.1%	100.0%	No
20	Paynes Creek	90	199,690	0.05%	100.00%	No

Winter-run Chinook Salmon

Actions proposed in the mainstem Sacramento River and in Battle Creek contributed to the evaluation for winter-run chinook salmon. The mainstem constitutes much of the critical habitat for this endangered species. Battle Creek is considered due its potential for providing for an additional spawning population of winter-run which would reduce the probability of extinction and contribute are accelerate the time required for recovery.

Late-fall-run Chinook Salmon

Late-fall-run chinook are evaluated based on actions proposed for the mainstem Sacramento River.

Spring-run Chinook Salmon

Spring-run chinook salmon are evaluated based on actions proposed in Mill Creek, Deer Creek, Big Chico Creek, and Butte Creek. In addition, restoration actions in the mainstem Sacramento River will contribute to the recovery of this stock.

Chinook Population Data

Fall-run chinook salmon return data are provided by the California Department of Fish and Game in the "GrandTab. Wk3" worksheet (Robert Kano, CDFG, Inland Fisheries Division), spring-run chinook salmon returns are from the Department of Fish and Game Report to the Fish and Game Commission: a status review of the spring-run chinook salmon in the Sacramento River drainage (Candidate Species Status Report 98-01. June 1998), winter-run chinook returns are from the National Marine Fisheries Service (Proposed Recovery Plan for the Sacramento River Winter-run Chinook Salmon, 1997), and late-fall-run chinook returns are from Central Valley Anadromous Sport Fish Annual Run-size, Harvest, and Population Estimates, 1967 through 1991 (Terry Mills and Frank Fisher, 1993, Department of Fish and Game).

The primary source of proposed restoration actions is the Ecosystem Restoration Program Plan, Volume II: Ecological Zone Visions (CALFED Programmatic EIS/EIR, Technical Appendix, March 1998). The primary source of proposed Stage I implementation actions is an exhibit prepared by CALFED staff for discussion by the Strategic Plan Core Team (Draft: July 30, 1998). Where appropriate, Salmon Subgroup members updated or corrected proposed actions based on personal knowledge of other ongoing actions such as the Category III early implementation actions, AFRP, and others.

Clearly, assessing the probability that a chinook stock will be recovered is not possible by evaluating upstream actions and the health of populations without also considering water management and habitat conditions in the Delta and the affect of harvest on chinook stocks. In this evaluation the team considered the cumulative benefits of ongoing management and restoration actions, actions proposed during Stage I Implementation and long-term CALFED implementation program, and other restoration actions such as those being implemented under the auspices of the Anadromous Fish Restoration Program of the Central Valley Project Improvement Act. The team felt comfortable in assessing the degree to which upstream would or would not contribute to recovery.

In this evaluation, the Team reviewed population trend data for each river and each stock and calculated cohort replacement rates to better determine present status. The status of each stock in each river was evaluated using Stage 1 and long-term restoration actions.

Scoring of Cumulative Actions

The Salmon Subgroup used a modification of the summary matrix and scoring system presented in the Diversion Effects Fish Issues and Impacts report (June 25, 1998) in this assignment. Scores could range from +1 to +7.

In general, the scores were assigned using the following criteria:

- +1 or +2 Upstream improvements in stream habitat quality and function likely **will not** increase chinook salmon production within the stream sufficiently for CALFED through its system-wide program, to achieve its salmon recovery goal.

- +3 through +5 Upstream improvements in stream habitat quality and function **may** increase chinook salmon production within the stream sufficiently for CALFED , through its system-wide program, to achieve its salmon recovery goal.

- +6 and +7   Upstream improvements in stream habitat quality and function **likely will** increase chinook salmon production within the stream sufficiently for CALFED , through its system-wide program, to achieve its salmon recovery goal.

Uncertainty

Two types of general uncertainty were associated with the evaluation: 1) uncertainty associated with the existing condition and causes of impacts on chinook salmon stocks, and 2) uncertainty associated with the predicted benefits and impacts of the cumulative restoration actions. Both types were integrated in the uncertainty scores in the table below. For existing conditions, the salmon subgroup felt the causes of impacts on salmon species are well-known and the uncertainty scores do not apply. The salmon team also recognized that considerable information exists as to causes, but decided to reflect only uncertainty in predicted benefits and impacts in assigning uncertainty scores. The adaptive management program will be an important aspect of recovery and the scores reflect the Subgroups opinion regarding the potential of resolving uncertainty issues.

The integrated levels of uncertainty associated with the scores were assigned:

1 = Low uncertainty
2 = Moderate uncertainty
3 = High uncertainty.